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Notes ID: 2113679644BAB0A0E5E04B8511DF3679

From: John Satterfield <john.satterfield@chk.com>

To: Robert Puls/ADA/USEPA/US@EPA

Copy To: Chris Hill <chris.hill@chk.com>; Mike Brownell <mike.brownell@chk.com>

Delivered Date: 09/14/2011 08:46 AM EDT

Subject: FW: revised proposed MW locations, soil sample locations

Bob,

As you requested, Chris has elevated the discussion concerning EPA's proposed monitoring well layout for the Haynesville study site. Based on the meeting minutes below, it appears a number of my initial concerns were already mentioned during this particular conference call. However, I would like to perhaps expand on a few and list others that have been identified to help you understand why Chesapeake believes installing these monitoring wells on the actual pad location offers a greater risk than reward in achieving what we believe are the goals of the HF study, and the prospective study we have partnered with you specifically. These observations are based on our staff's extensive experience in designing and performing environmental groundwater studies - including those under the auspices of EPA.

Repeatability and data integrity - Should monitoring wells be placed in the area upon which the wellpad will be constructed to collect baseline data, they will have to be plugged and abandoned before construction activities can begin. Drilling of new monitoring wells once the pad has been constructed will not allow what we would consider to be apples to apples results. In addition, the drill of monitoring wells could have an effect on water quality that could be attributed to the production well. We strongly believe that dedicated monitoring wells should be installed and maintained for the life of the study. Whereas a snapshot of groundwater quality or subsurface shallow geology can be obtained with temporary wells, repeatability and reliability of groundwater samples - and the subsequent analyses - over the course of the study would be compromised.

Monitoring well integrity and drinking water aquifer protection - The installation of monitoring wells on the pad places a unnecessary risk to the monitoring wells' integrity and, therefore, the overall study. A wellpad is designed to allow employee safety and protection of the environment during mobilization, operation, and demobilization required to conduct site construction, drilling, hydraulic fracturing, and production equipment installation. Likewise, our wellpads are designed to keep fluids on the location during these operation. We believe it is not prudent to drill multiple potential pathways to the drinking water aquifer in the very area these highly intensive operations will be conducted. The opportunity for one or more of the monitoring wells to be damaged as heavy trucks and equipment are maneuvered around the wellpad are too great.

Spill/emergency response - In the unlikely event of a spill or other onsite emergency requiring response, the monitoring wells will represent a potential impedance to proper and rapid response as, again, damage to these wells would open pathways directly to the aquifers.

Study impedance - Monitoring wells off the pad could be readily accessible by the EPA and CHK. However, monitoring wells on the pad could be inaccessible because of safety concerns and/or physically barriers (installed drilling mats, liners, etc.). In addition, sampling on the pad would initiate an additional

level of safety requirements (e.g., job safety analysis, PPE, supervision, etc.) and appropriate CHK personnel resources. Operational impedance - Chesapeake has volunteered the Haynesville site and technical personnel resources based on the understanding that the Study would have minimal impact on our field operations. Based on the above issues, we believe installation and sampling of monitoring wells on the pad would impact our operations in a significant manner. During all phases of the development the monitoring wells would be considered obstacles for our Operations personnel. Likewise, the installation of directionally drilled monitoring wells may impede Chesapeake's ability to drill subsequent oil and gas wells on the wellpad because of subsurface obstacles.

In addition to the concerns mentioned above, we find it particularly confusing that it appears monitoring wells located within a 15 meter radius, and as close as 3 meters, of the wellbore are proposed to be the primary sources of information used to determine if there has been an impact to the aquifer caused by "hydraulic fracturing" (i.e., oil and gas development). Since it's extremely improbable, and likely illegal, to have a drinking water well located in such proximity to a oil and gas wellbore, we're unsure how this would equate to identifying potential exposures to the public.

Given these concerns, we would strongly suggest EPA consider installing the monitoring wells outside, though proximal, to the edges of the wellpad.

We appreciate the fact that you and your team are looking in to alternative monitoring well layouts for the study, we hope that our comments assist you in the development of these alternatives. Please let me know if you have any questions regarding our concerns. Chesapeake appreciates the opportunity to partner with EPA on this very important Study.

Thank you,
John Satterfield
Director Environmental and Regulatory Affairs
Chesapeake Energy Corporation
Office: (405) 935-3171
Fax: (405) 849-3171
E-mail: john.satterfield@chk.com

-----Original Message-----

From: Puls.Robert@epamail.epa.gov [mailto:Puls.Robert@epamail.epa.gov]
Sent: Wednesday, August 31, 2011 10:50 AM
To: Puls.Robert@epamail.epa.gov
Cc: Chris Hill; cquina@ene.com; Florentino, Gene; Lukert, George; John Satterfield; Overbay.Michael@epamail.epa.gov; Mravik.Susan@epamail.epa.gov
Subject: Re: revised proposed MW locations, soil sample locations

Upon further consideration I suggest the following and we can discuss this Friday. But for now: George, please make the changes I suggest and distribute so we all have something to look at this Fri.

I suggest the following:

- a total of 3-3 well clusters; one located 3-4 meters downgradient of the production well; the other 2 located about 15 meters downgradient and separated by about 10 meters
- a 2-well cluster upgradient about 15 meters (longer screens than the 3 well clusters (screen lengths TBD following geophysics from open hole drilled through the entire thickness of the surficial aquifer
- 1 deep well located about 400 meters from the end of the lateral, on top of the lateral location and completed in the first water bearing zone beneath the surficial aquifer (i.e. a different aquifer)

I further suggest we alter our plans to do the QAPP in its entirety at this time. All we need to address right now is the baseline sampling program. This would include soil sampling, well design/construction, sampling of monitoring wells and private wells and all the associated field and lab methods and analyses..

As far as geophysics consider the following:

downhole video
3-arm caliper
natural gamma
electromagnetic induction
single point resistance
self potential
long and short normal resistivity
acoustic and optical televiewer with borehole deviation
fluid conductivity-- logged under ambient and pumped conditions
fluid temperature-- logged under ambient and pumped conditions
heat-pulse flowmeter or EM flowmeter -- logged under ambient and pumped conditions

Robert W. Puls, Ph.D.
Agency technical Lead, Hydraulic Fracturing Study
Ground Water and Ecosystems Restoration Division
National Risk Management Research Laboratory, USEPA
P.O. Box 1198 / 919 Kerr Research Dr.
Ada, OK 74820
puls.robert@epa.gov
580-436-8543 (phone)
405-323-8119 (mobile)

From: Robert Puls/ADA/USEPA/US
To: chris Hill <chris.hill@chk.com>, puls.robert@epa.gov,
"Florentino, Gene" <GFlorentino@ene.com>, "Lukert, George"
<GLukert@ene.com>, cquina@ene.com, John Satterfield
<john.satterfield@chk.com>, Susan Mravik/ADA/USEPA/US@EPA,
Michael Overbay/R6/USEPA/US@EPA
Date: 08/30/2011 01:07 PM
Subject: revised proposed MW locations, soil sample locations

[attachment "Fig4_SoilSampleLocations Rev 082911.pdf" deleted by Robert Puls/ADA/USEPA/US] [attachment "Figure3_OG_WaterWell Rev 082911.pdf" deleted by Robert Puls/ADA/USEPA/US]

Robert W. Puls, Ph.D.
Agency technical Lead, Hydraulic Fracturing Study
Ground Water and Ecosystems Restoration Division
National Risk Management Research Laboratory, USEPA
P.O. Box 1198 / 919 Kerr Research Dr.
Ada, OK 74820
puls.robert@epa.gov
580-436-8543 (phone)
405-323-8119 (mobile)

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